



Source and distribution of sedimentary thallium in the Bohai Sea: Implications for hydrodynamic forces and anthropogenic impact

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Thallium (Tl), a non-essential and highly toxic trace metal, is listed as priority toxic pollutant by the United States Environmental Protection Agency (USEPA) (Keith and Telliard, 1979). However, its geochemical cycling in aquatic environment has received far less attention than that of many other trace metals. This has been attributed to relatively little commercial interest in Tl and, until recently, problems inherent in its detection at environmental concentrations (Meeravali and Jiang, 2008).

In this study, we investigated the sources, distribution and fate of Tl in surface sediments of the Bohai Sea (BS), China, based on the datasets of total Tl and chemical speciation of Tl of 408 surface sediment samples in the total entire BS. The enrichment factors and chemical speciation of Tl indicated that Tl in BS was dominated by natural Tl, although anthropogenic Tl contamination was observed in the Liuguhe River mouth; the mud deposits are the sinks of Tl and the regional currents and tide systems play a key role on the accumulation of Tl in BS. The distribution of Tl consistent with that of MnO and Fe₂O₃ as well as the level of Fe-Mn fraction is relatively high, indicating MnO and Fe₂O₃ influence the geochemical behaviors of Tl in the BS. Although the positive correlation between Tl and TOC is observed for the samples in the BS, however, level of Tl in oxidizable fraction could be neglected, suggesting TOC might not be a major factor affecting the concentration of Tl in BS. The low proportion of Tl in the non-residual fraction dominated by the Fe-Mn oxides suggested that the labile Tl was controlled by the Fe-Mn oxides and Tl has a low bioavailability and a minor potential threat to biota in BS.

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References

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